1. INTRODUCTION

Salt (sodium chloride) is a relatively cheap and effective highway deicing chemical. Unfortunately it is also very corrosive to the steel used in motor vehicles and structures such as road bridges. An alternative material without the corrosive side effects of salt and available at a reasonable cost would be highly desirable.

BP Chemicals Ltd are investigating alternative deicing chemicals and this report describes some investigations carried out on their behalf of the corrosivity of a number of materials under immersed conditions.

2. MATERIALS TESTED

Calcium magnesium acetate (CMA)

Liquid acetate (LA)

Urea

Sodium chloride (NaCl)

Calcium chloride (CaCl2)

Demineralised water

3. EXPERIMENTAL

Sets of 9 smooth mild steel panels, each 150mm by 100 mm by 1 mm thick were stamped with an identification code, degreased in an acetone/xylene mixture, dried and weighed. 3% solutions of each of the test materials were prepared and a set of panels suspended vertically, fully immersed in each solution. The solutions were contained in glass beakers with 3 panels per beaker. The beakers were open to the air and solutions were not stirred. The solutions were regularly topped up with demineralised water to maintain a constant volume.

At 3, 6 and 9 week intervals 3 panels were removed from each solution - in fact one of the 3 beakers forming a solution set was used. The panels were washed with demineralised water to remove any rust staining then immersed in Clarke's solution (concentrated hydrochloric acid containing 20 grams/litre of antimony trioxide and 50 grams/litre of stannous chloride) to remove any remaining rust without attacking the steel. After washing in water then acetone the panels were dried and reweighed to establish weight loss over each exposure period. Prior to derusting representative panels were photographed both before and after the water washing to remove rust staining.

At the end of the experiment the pH of each solution was measured.